ULTRA LOW NOx: MULTIPOINT LEAN DIRECT INJECTION

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UEET Project: Emissions Reduction

Relevant Level 1 Milestone: **Demonstration of 70% LTO NOx Reduction in a Flametube**
Due date: September 30, 2000

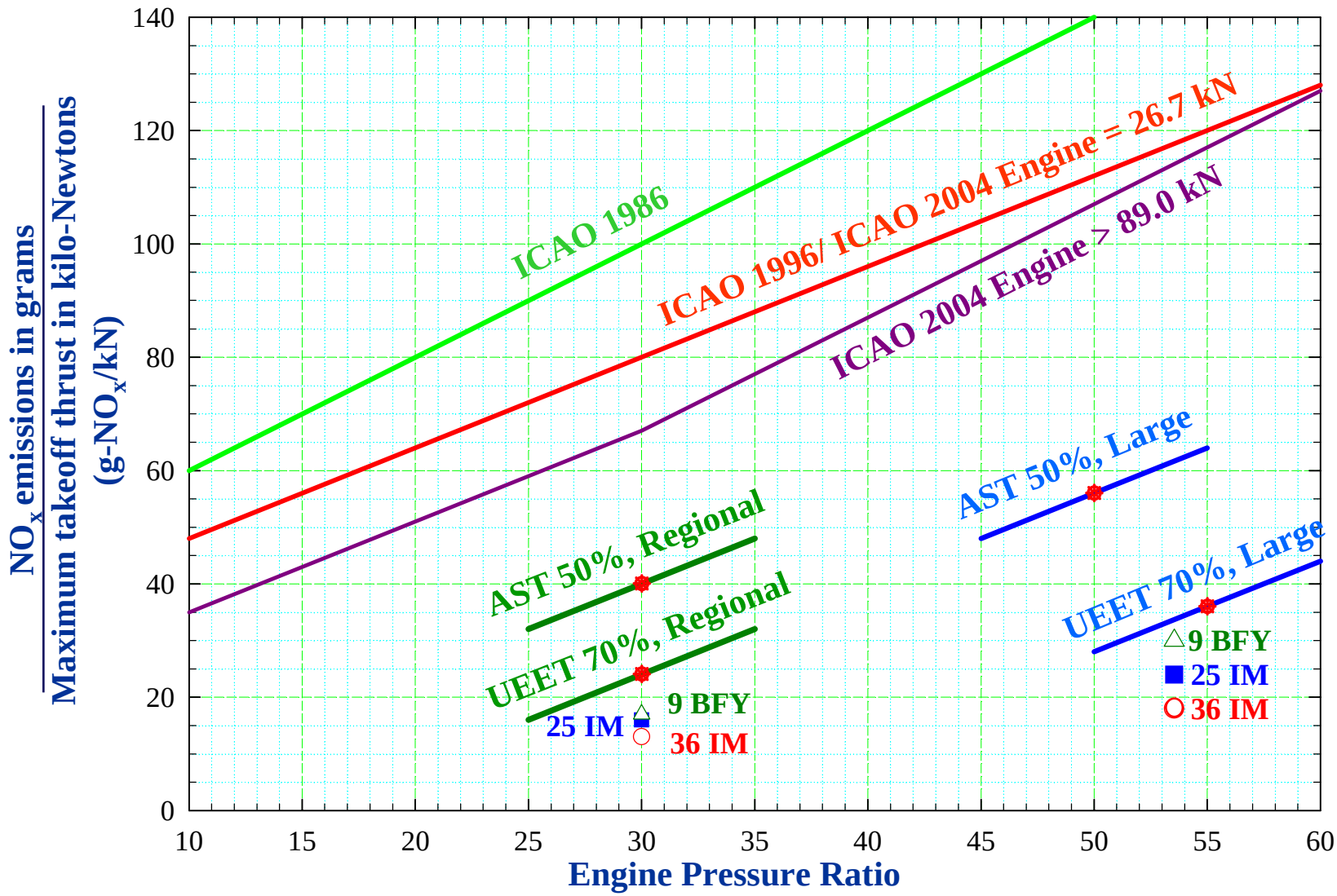
Shown: NOx Emissions as a Function of Flame Temperature and Compared to ICAO Standards; 36 Point Integrated Module, 9 Point Butterfly

Accomplishment : Three Multipoint LDI concepts were tested in 25 atmosphere flametubes this quarter. NOx reductions of 83%, 76% and 73% relative to the ICAO standard were achieved with the 36 Point Integrated Module, the 25 Point Integrated Module and the 9 Point Butterfly fuel injectors respectively. Fuel Staging with the 25 Point Integrated Module reduced the low power fuel-air ratio necessary for good performance by one-half but another reduction of one-half is necessary.

Future Plans:

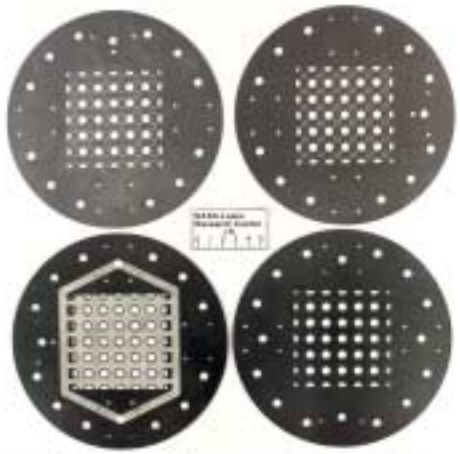
- 55 atmosphere ASCR test of 25 Point Integrated Module 15^{o} Sector
- Flametube test of 36 Point Integrated Module with 6 fuel stages to determine optimum staging and if a separate pilot is necessary.
- Flametube test of 9 Point Butterfly with improved dome cooling and three fuel stages.

NOx Emission Characteristics, ICAO Regulations, and NASA's AST and UEET Goals



MultiPoint Lean Direct Injection

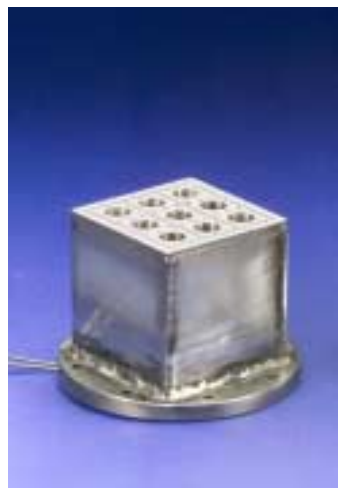
36 Point
Integrated Module



Parker Patents 5 435 884, 5 740 967

NASA/Parker Patent Application

9 Point Butterfly



Sun Valley Technologies